

# TEST LABORATORY



The test laboratory is accredited in compliance with DIN EN ISO/IEC 17025 by the Deutsche Akkreditierungsstelle GmbH. The accreditation is also valid for products of Regulation EU 2016/425. Test methods not included in the scope of accreditation are marked by a \*.



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## TEST REPORT

**Order number STFI:** 20200069.5  
**Order number client:** none  
**Report date:** 4 February 2020  
**Person responsible:** Reinhardt  
**Orderer:** Vescom B.V.  
Sint Jozefstraat 20  
5753 AV Deurne  
NETHERLAND  
**Test order:**  
**Date:** 14 January 2020  
**Order received:** 16 January 2020  
**Material received:** 16 January 2020

### Material to analyse:

signed by client		code for order processing
TULA 8080	col.: 02	P0069_20_16
TULA 8080	col.: 06	P0069_20_17
TULA 8080	col.: 03	P0069_20_18

The sampling was supplied by the client. The test department is not informed about the sampling procedure.

### Analysis content:

- (1) Remission and transmission in the visible light range in accordance with DIN EN 410: 2011-04 (DIN EN 14500: 2008-08)
- (2) Remission and transmission in the global radiation range in accordance with DIN EN 410: 2011-04 (DIN EN 14500: 2008-08)
- (3)\* Calculation of the total energy permeability degree  $g_{tot}$  of a window system with sun protective material, following DIN EN ISO 52022-1: 2018-01 and approximate calculation of the reduce factor  $F_c$  following DIN EN 14501: 2006-02
- (4)\* Calculation of the total energy permeability degree  $g_{tot}$  and the direct solar transmittance  $\tau_{e,tot}$  of a window system with sun protective material, following DIN EN ISO 52022-1: 2018-01 and approximate calculation of the reduce factor  $F_c$  and the secondary heat transfer factor  $q_{i,tot}$  following DIN EN 14501: 2006-02 (only for reference glazing C of DIN EN 14501: 2006-02)
- (5) Direct and diffuse transmission measurement in the visible light range in accordance with DIN EN 410: 2011-04 (DIN EN 14500: 2008-08)
- (6)\* Classification of glare control in accordance with DIN EN 14501: 2006-02 (p.15; paragraph 6.3; table 8)
- (7)\* Classification of privacy night in accordance with DIN EN 14501: 2006-02 (p.16; paragraph 6.4; table 9)
- (8)\* Classification of the visual contact with the outside in accordance with DIN EN 14501: 2006-02 (p.17; paragraph 6.5; table 10)
- (9)\* Classification of the daylight utilisation in accordance with DIN EN 14501: 2006-02 (p.18; paragraph 6.6; table 11) on the basis of the rotational symmetric diffuse/hemispherical light transmission degree  $\tau_{v,dif-h}$ , approximately calculated after equation 18 in DIN EN 14500: 2008-08

\* Standards for calculation and assessment are not allowed for accreditation

**Conditions and equipment for optical tests:**

test parameter	symbol	range of radiation
light transmission degree	$\tau_{v,n-h}$	380...780 nm (standard light D65)
light remission degree	$\rho_{v,n-h}$	380...780 nm (standard light D65)
light absorption coefficient	$\alpha_v$	380...780 nm
UV - transmission degree	$\tau_{uv}$	280...380 nm (UV-radiation)
solar transmission degree	$\tau_{e,n-h}$	280...2500 nm (global radiation)
solar remission degree	$\rho_{e,n-h}$	280...2500 nm (global radiation)
solar absorption coefficient	$\alpha_e$	280...2500 nm
normal/normal light transmission degree	$\tau_{v,n-n}$	380...780 nm (standard light D65)
normal/diffuse light transmission degree	$\tau_{v,n-dif}$	380...780 nm (standard light D65)

Equipment: UV-VIS-NIR double beam spectrophotometer, company PERKIN - ELMER Corp., USA; 150 mm integrating sphere; irradiation perpendicular to the integrating sphere opening; 8° slope of the sample area to the light incidence axis for remission measurements

For each material sample of the client three samples in the format (55 x 75) mm are taken, one in the machine direction, one in the cross machine direction and one diagonally. The irradiation takes place, if not otherwise noted, on the material side which is faced to the window system.

Description of classification for visual comfort:

Description of classification for glare control, privacy night, visual contact with the outside and the daylight utilisation is given in DIN EN 14501: 2006-02 (p.13; paragraph 6.1 table 5).

<b>Influence on visual comfort</b>					
<b>class</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	very small effect	small effect	moderate effect	high effect	very high effect

**Test results:**
**(1) Light range**
**UV-range**

code	light transmission degree	light remission degree	light absorption coefficient	UV-transmission degree <sup>1)</sup>
P0069_20	$\tau_{v,n-h}$	$\rho_{v,n-h}$	$\alpha_v$	$\tau_{UV}$
16	0,0730	0,3427	0,5843	0,0307
17	0,0207	0,1210	0,8583	0,0153
18	0,0257	0,1593	0,8150	0,0190

<sup>1)</sup> In textile samples which were finished with an optical brightener the measured values of the UV-transmission degree could be doubtful (higher) under the use of the above described measuring method.

**(2) Global radiation range**

code	solar transmission degree	solar remission degree	solar absorption coefficient
P0069_20	$\tau_{e,n-h}$	$\rho_{e,n-h}$	$\alpha_e$
16	0,0893	0,3540	0,5567
17	0,0360	0,1610	0,8030
18	0,0393	0,1893	0,7714

**(3)\* Total energy permeability degree  $g_{tot}$  and reduce factor  $F_c$** 

	single glazing		double glazing with air interspace		double glazing with low emission degree and argon interspace		triple glazing with low emission degree and argon interspace	
code	$U_g=5,8 \text{ W/(m}^2\text{K)}$ $g=0,85$		$U_g=2,9 \text{ W/(m}^2\text{K)}$ $g=0,76$		$U_g=1,2 \text{ W/(m}^2\text{K)}$ $g=0,59$		$U_g=0,8 \text{ W/(m}^2\text{K)}$ $g=0,55$	
P0069_20	$g_{tot}$	$F_c$	$g_{tot}$	$F_c$	$g_{tot}$	$F_c$	$g_{tot}$	$F_c$
16	0,52	0,61	0,52	0,68	0,45	0,77	0,43	0,79
17	0,62	0,73	0,61	0,81	0,52	0,87	0,49	0,89
18	0,61	0,71	0,60	0,79	0,51	0,86	0,48	0,88

reference glazing - DIN EN 13363-1: 2007-09				
code	triple glazing		double glazing with thermal protective covering	
	$U_g=2,0 \text{ W/(m}^2\text{K)}$ $g=0,65$		$U_g=1,6 \text{ W/(m}^2\text{K)}$ $g=0,70$	
P0069_20	$g_t$	$F_c$	$g_t$	$F_c$
16	0,48	0,74	0,51	0,72
17	0,55	0,85	0,59	0,85
18	0,54	0,83	0,58	0,83

**(4)\* Total energy permeability degree  $g_{tot}$ , direct solar transmittance  $\tau_{e,tot}$ , reduce factor  $F_c$  and secondary heat transfer factor  $q_{i,tot}$**

double glazing with low emission degree (reference glazing C of DIN EN 14501: 2006-02)				
code	$U_g=1,2 \text{ W}/(\text{m}^2\text{K})$ $g=0,59$		$\tau_e=0,49$ $\rho'_e=0,27$	
P0069_20	$g_{tot}$	$F_c$	$\tau_{e,tot}$	$q_{i,tot}$
16	0,45	0,77	0,05	0,41
17	0,52	0,87	0,02	0,50
18	0,51	0,86	0,02	0,49

**Mounting assumptions:**

- sun protective material inside and closed
- aerated interspace to the glazing

The mathematical model in DIN EN ISO 52022-1: 2018-01 (simplified method) for calculation of  $g_{tot}$  and  $\tau_{e,tot}$  is appropriated to a coarse compare of sun protection materials. The model is only valid for the following boundary requirements:

- $0 \leq \tau_{e,n-h} \leq 0,5$
- $0,1 \leq \rho_{e,n-h} \leq 0,8$

If the above mentioned boundary requirements are not fulfilled, the calculation of  $F_c$  from  $g_{tot}$  and  $g$  is not guaranteed either. The calculation is recommended in accordance with DIN EN ISO 52022-3: 2018-01 (detailed calculation method). Therefore it is necessary to measure the reflection of the sample side which is not directly exposed by the sun radiation and the sample thickness at least in addition to the data of this order. In case of known conditions to be used at a building it is unalterable.

**(5) Diffuse and normal transmission in the visible light range**

code	normal/hemispherical light transmission degree	normal/diffuse light transmission degree	normal/normal light transmission degree
P0069_20	$\tau_{v,n-h}$	$\tau_{v,n-dif}$	$\tau_{v,n-n}$
16	0,0730	0,0683	0,0047
17	0,0207	0,0140	0,0067
18	0,0257	0,0207	0,0050

**(6-8)\* Classification**

code	glare control	privacy night	sight contact with the outside
P0069_20			
16	1	2	1
17	3	2	2
18	2	2	2

**(9)\* Classification of the daylight utilisation**

code	diffuse/hemispherical light transmission degree	daylight utilisation
P0069_20	$\tau_{v,dif-h}$	
16	0,0643	1
17	0,0174	0
18	0,0221	1

The results are mean values from three measurements; spectrograms are kept in the test department.


Unless otherwise agreed, all materials we received within this order will be kept for a maximum time of 6 month. Materials which are not stored because of technical or safety reasons are excluded from that.

The testing period is defined as timeframe between receipt of samples and issue date of test report.

The test results are referring to the submitted samples. These test report is not allowed to copy in parts.

  
 Dipl.-Ing. Marian Hierhammer  
 head of test department



  
 Patrick Reinhardt, M.Sc.  
 field responsible collaborator